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Original Research Article

Role of Biochemical Markers in Acute Pancreatitis

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Abstract:

Introduction: Acute Pancreatitis is a condition that is characterized by an acute inflammation of the pancreas. Patients who are experiencing significant acute upper abdominal pain should be suspected of having acute pancreatitis; nevertheless, in order to establish the diagnosis, it requires either biochemical or radiologic evidence.

Aims and Objectives: The purpose of this study is to determine the role of biochemical marker in predicting acute pancreatitis.

Methods: This is a Retrospective study conducted in Department of Biochemistry, Government General Hospital, Kurnool from May 2023 to November 2023. Data collected from the Medical records were age, Sex, Levels of Serum amylase and Lipase amylase lipase ratio.

Results: Among the Total 90 patients males constituted 73.3% (n=66) and Females 26.7% (n=24). The mean age and SD of the patients in this study group was 38.5±2.2.5years Mean and SD of Amylase, Lipase and Amylase Lipase Ratio was 870.3±754.23, 235.8±124.5 and 3.87±2.45. The sensitivity and specificity of amylase and Lipase at 3 fold above Normal limit were 83.33% and specificity 84.88%. Positive predictive value 85.23% and Negative Predictive value 82.95%.Accuracy 84.09%.

Conclusion: In patients with abdominal pain consistent with Acute Pancreatitis, the ACG practice guidelines consider lipase and/or amylase increase greater than 3 times ULN as diagnostic. Lipase is slightly more Acute Pancreatitis-specific than amylase. It rises earlier and stays higher than serum amylase in AP patients. Serum lipase outpaced serum amylase in diagnostic accuracy.

Keywords: Acute Pancreatitis, Amylase, Lipase, Amylase and Lipase Ratio.

Introduction

The most common cause of hospitalization among gastrointestinal illnesses is acute pancreatitis, which is also the most prevalent condition overall. This condition is characterized by a severe inflammation of the pancreas.

There is a wide range of severity in acute pancreatitis, ranging from mild illnesses that require conservative treatment to severe and complicated disorders that have a high morbidity and mortality rate.[1] The prevalence of pancreatitis in India is 2.6-3.2 cases per 100,000. [2]

Acute Pancreatitis patients suffer from frequent episodes of nausea, vomiting, and abdominal pain; the condition has a negative impact on quality of life. [3]

As per American Gastroenterological Association guidelines At least two of the following criteria are needed to diagnose Acute Pancreatitis abdominal discomfort, biochemical evidence of pancreatitis (e.g., increased amylase or lipase >3 times the upper limit of normal), and/or radiographic evidence on cross-sectional imaging. [4]

Elevation of amylase and lipase is a significant characteristic in the diagnosis of AP, according to the consensus definition of the condition.

As a result of the laboratory tests, the etiology of pancreatitis can be determined, and the treatment of the pancreatitis can be combined with the treatment of the cause. [5]

This study aims to determine the role of biochemical marker in predicting acute pancreatitis.

Materials and Method

The study was a hospital based Retrospective, Observational study done at the department of

Biochemistry, GGH, Kurnool during the period of May 2023-November 2023. Patients with acute pancreatitis aged above 18 yrs. are admitted to General Surgery Department, GGH, Kurnool were included in the study . Chronic Kidney, Liver disease patients, Incomplete Data were excluded from this study. Biochemical Markers Serum Amylase are estimated in Erba semi-automated analyser using Enzo Pak (Recon Diagnostic Kit)

In acute pancreatitis, blood amylase levels increased. Sometimes the highest normal level can rise by 6-4 times. Amylase levels increase in disorders such pancreatic duct obstruction, cancer, and biliary issues. Different amylase isoenzymes exist. Various tissue types may be present in blood and urine, regardless of permissible levels.

Pancreatic tissue injury or duct blockage can lead to elevated serum amylase levels. Note that the typical amylase concentration range is 15-110 IU/L. [6] Serum Lipase are estimated in Erba semi-automated analyser using EnzoPak (Recon Diagnostic Kit)

In acute pancreatitis, lipase levels can reach 10.5 times normal. Lipase levels may rise in diseases such as kidney disease, salivary gland inflammation, intestinal obstruction, or ulcer, but not in these measured levels. Normal lipase values are 10-80 IU/mL. [6]

Statistical Analysis

Descriptive statistics were calculated for all demographic and Biochemical parameter of the patients. Mean±SD were calculated. Frequency tables were drawn for distribution of data. All the statistical data analysis was performed using software SPSS (version 21.0)

Results

Table 1: Gender wise distribution of acute pancreatitis

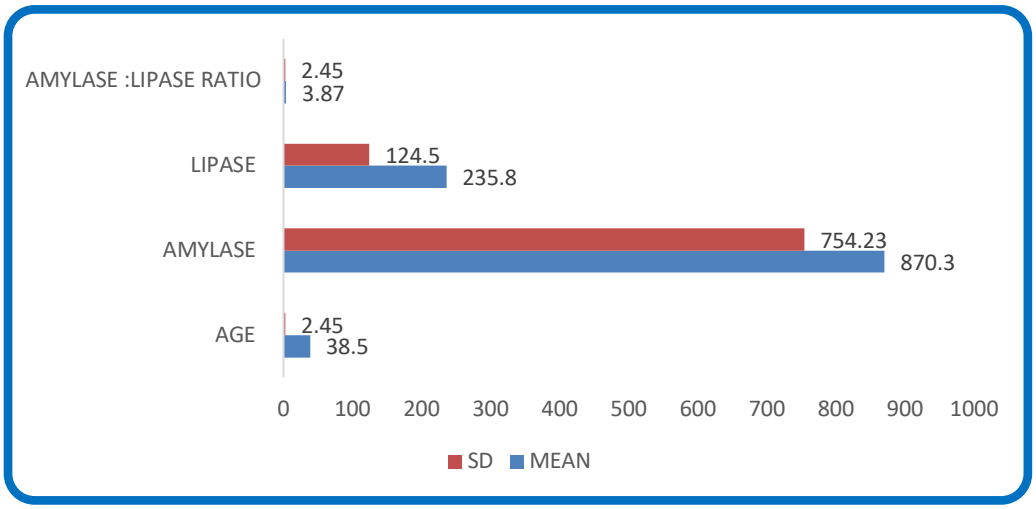
Gender	Number(n)	Percentage (%)
Male	**66**	**73.3%**
Female	**24**	**26.7%**

Table 1 shows that Among the Total 90 patients males constituted 73.3% (n=66)and Females 26.7%(n=24).

Table 2:

Biochemical Marker	Raised	Normal
Serum amylase	75	13
Serum Lipase	73	15
Serum Amylase Lipase Ratio	54 (>3)	36(<3)

13 patients had normal Serum Lipase, and 75 had increased serum amylase. 73 patients had increased serum Lipase and 15 had Normal serum Lipase levels. 54 had > 3 Amylase Lipase Ratio and 36 had <3 Amylase Lipase Ratio.



Graph 1: Mean and SD of Age, Amylase, Lipase and Amylase Lipase Ratio

Graph 1 depicts the mean age and SD of the patients in this study group was 38.5±2.2.5years and commonest age group affected was 31-40 yrs Mean and SD of Amylase, Lipase and Amylase Lipase Ratio was 870.3±754.23, 235.8±124.5 and 3.87±2.45. The serum lipase: amylase ratio can therefore be used as an useful index for predicting the alcoholic and Non-alcoholic pancreatitis.

Table 3: Sensitivity, specificity, Positive predictive value, Negative predictive value and respective 95% confidence interval for amylase and Lipase for diagnosing acute pancreatitis

Statistic	Value	95% CI
Sensitivity	83.33%	74.00% to 90.36%
Specificity	84.88%	75.54% to 91.70%
Positive Likelihood Ratio	5.51	3.31 to 9.17
Negative Likelihood Ratio	0.20	0.12 to 0.31
Disease prevalence (*)	51.14%	43.50% to 58.73%
Positive Predictive Value (*)	85.23%	77.61% to 90.57%
Negative Predictive Value (*)	82.95%	75.25% to 88.62%
Accuracy (*)	84.09%	77.83% to 89.16%

The sensitivity and specificity of amylase and Lipase at 3 fold above Normal limit were 83.33% and specificity 84.88%. Positive Liklihood ratio 5.51 and Negative Liklihood ratio 0.20. Positive predictive value 85.23% and Negative Predictive value 82.95%. Accuracy 84.09%.

Discussion

The present study showed that Among the Total 90 patients males constituted 73.3% (n=66) and Females 26.7% (n=24). The mean age and SD of the patients in this study group was 38.5±2.2.5years and commonest age group affected was 31-40 yrs. This is similar to other studies Annie E. Cook et al [7] Harish Kumar et al. [8] 13 patients had normal serum Lipase, and 75 had increased serum amylase. 73 patients had increased serum Lipase and 15 had Normal serum Lipase levels. The Mean serum Lipase is 235.8 IU/L. The mean Serum amylase is 870.3 IU/L.

Serum lipase/amylase ratio with a cut off value fixed at 3.0 can assist in differentiating alcoholic AP from non-alcoholic AP. 54 had > 3 Amylase Lipase Ratio and 36 had <3 Amylase Lipase Ratio. This is similar to other studies Anitha Devanath et al [9] and Harish kumar et al [8] The serum lipase: amylase ratio can be used as an useful index for predicting the alcoholic and Non-alcoholic pancreatitis.

Present study shows that the sensitivity and specificity of amylase and Lipase at 3 fold above Normal limit were 83.33% and specificity 84.88%. Positive Liklihood ratio 5.51 and Negative Liklihood ratio 0.20. Positive predictive value 85.23% and Negative Predictive value 82.95%. Daignostic Accuracy 84.09%. This results suggest that Serum biochemical markers are helpful for prediction of acute pancreatitis.

A sensitivity of 85–100% and specificity of 84.9–99% in the diagnosis of acute pancreatitis was found in one study done by Apple et al. [10] Annie E. Cook et al Study shows that The sensitivity and specificity of amylase and Lipase were 83.3% and 97.4%. The only two objective criteria for diagnosis are elevated serum lipase and/or amylase values and imaging findings characteristic of Acute Pancreatitis. Clinical usage of amylase before lipase. The first pancreas disease laboratory test was performed in 1919. Amylase levels frequently rise 6 to 24 hours after AP, peak at 48 hours, and stabilize over 5 to 7 days. Thus, its half-life is shorter than lipase's. Thus, amylase levels revert to normal even when pancreatic inflammation persists.

Amylase weighs 50,000 Daltons. Its low molecular weight allows it to pass through the glomerulus into urine. Kidneys eliminate it after a 2-hour half-life. Urinary amylase was previously sensitive for AP diagnosis. Urine amylase was not more diagnostic than serum amylase and other serum assays. Serum amylase is fast and more accurate. Urinary amylase has low specificity. Thus, urine amylase estimate is no longer used clinically. Amylase also rises with aging. Infant amylase levels are low and grow slowly to adult levels by age 10. The upper limit of normal rises 40% after 80 years. [11]

In the early 1930s, Cherry and Crandall described lipase for AP diagnosis [12] Serum lipase is concentrated in pancreatic acinar cells as granules. The apical poles of the acinar cells discharge almost 99% of accumulated lipase into the pancreatic ductal system. Under normal settings, less than 1% diffuses from the basilar pole of acinar cells to lymphatics and capillaries and then to the circulation. Lipase increases 4–8 h after acute pancreatitis, peaks at 24 h, and decreases 8–14 days. Lipase half-life in plasma is 6.7-13.7 hours. Since it has a longer half-life than amylase, its activity remains higher. The glomerulus filters and tubules absorb lipase. Amylase does not undergo tubular reabsorption; therefore lipase may have a prolonged half-life. The renal tubules metabolize lipase. [13]

In the event that the pancreatic inflammation, these enzymes are eventually discharged into the bloodstream. During the process of amylase being eliminated through the urine, lipase is reabsorbed back into the circulation. When a patient is suffering from acute pancreatitis, the serum activity of both enzymes is significantly elevated.

Both lipase and amylase have excellent sensitivity, specificity, and Diagnostic accuracy

Conclusion

The findings of this study may suggest that the Biochemical markers amylase and lipase tests continue to play an important role in the diagnosis, but they are unable to determine the underlying cause of acute pancreatitis with certainty. The L/A ratio is reliable predictor factor and useful in discriminating between acute episodes of alcoholic pancreatitis and non-alcoholic pancreatitis cases. While ultrasonography and/or contrast-enhanced computed tomography are still considered to be the gold standard for diagnosing acute pancreatitis, the clinical presentations of abdominal discomfort, serum amylase and/or lipase levels, and other diagnostic tools are still often used.

References

1. Werge M, Novovic S, Schmidt PN, Gluud LL. Infection increases mortality in necrotizing pancreatitis: A systematic review and meta-analysis. Pancreatology. 2016 Sep-Oct; 16(5): 698-707.
2. Darshan Parmar, A Study on Clinical Profile and Complications of Acute Pancreatitis at a Tertiary Care Centre, Ahmedabad: A Case-Series GCSMC J Med Sci Vol (XI) No (II) July - December 2022.
3. Pendharkar SA, Salt K, Plank LD, et al. Quality of life after acute pancreatitis: a systematic review and metaanalysis. Pancreas 2014; 43:1194–1200.
4. Tenner, Scott MD, American College of Gastroenterology Guideline: Management of Acute Pancreatitis. American Journal of Gastroenterology. September 2013; 108(9):1400-1415.
5. Muniraj, Thiruvengadam & Gajendran, Mahesh & Thiruvengadam, Sudha & Raghuram, Karthik & Rao, Seema & Devaraj, Prathab. Acute Pancreatitis. Disease-a-month: DM. 2012; 58:98-144.
6. ESMAILI et al. Diagnostic Value of Amylase and Lipase in Diagnosis of Acute Pancreatitis, Biomed. & Pharmacol. J., 2017; 10(1): 389-394.
7. Cook Annie E., Jalavu Thumeka P., Zemlin Annalise E. Audit of amylase and lipase requests in suspected acute pancreatitis and cost implications, South Africa. Afr. J. Lab. Med
8. Harish Kumar C, Mridul GS. A retrospective study of clinical efficacy of serum lipase/amylase ratio in predicting etiology of acute pancreatitis. Int Surg J. 2018; 5:1365-7.
9. Devanath A, Kumari J, Joe J, Peter S, Rajan S, Sabu L, Shivshankar, Mary J, Smitha, Roselin, Arokiasami. Usefulness of lipase / amylase ratio in acute pancreatitis in South Indian population. Indian J Clin Biochem. 2009 Oct; 24(4): 361-5.
10. Apple F, Benson P, Preese L, et al. Lipase and pancreatic amylase activities in tissues and in patients with hyperamylasemia. Am J Clin Pathol 1991; 96:610–14.
11. Vissers RJ, Abu-Laban, Mc Hugh DF. Amylase and lipase in the emergency department evaluation of acute pancreatitis. J Emerg Med. 1999; 17: 1027-1037.
12. Cherry IS, Crandall LA. The specificity of pancreatic lipase: Its appearance in the blood after pancreatic injury. Am J Physiol. 1932; 100: 266-273.
13. Tietz N, Shuey D. Lipase in serum-the elusive enzyme: an overview. Clin Chem. 1993; 39: 746-756.
14. Sacher RA, McPherson RA, Campos JM. Widmann's clinical interpretation of laboratory tests. Philadelphia: F. A. Davis Company. 1991.